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1 INTRODUCTION

Article 82 of the EC Treaty states that any abuse of a dominant position is prohibited, and mentions four examples of abuses: (i) directly or indirectly imposing unfair prices or other unfair trading conditions; (ii) limiting production or development to the prejudice of consumers; (iii) unequal treatment of trading parties, thereby placing some at a competitive disadvantage; and (iv) making use of tying contracts, hence, forcing unnecessary supplementary obligations on customers. Of course, other price or non-price strategies may be considered an abuse as well; see Section 2.

It is important to note that Article 82 EC does not forbid certain types of behaviour as such; only dominant firms are forbidden from using such strategies. In two of the earliest cases arising out of the article 82, *United Brands*[1] and *Hoffmann-La Roche*,[2] the ECJ (the European Court of Justice) gave a definition of dominance that still stands today: a dominant position is a position of economic strength that enables a firm to prevent effective competition on the relevant market; a firm with a dominant position has the power "to behave to an appreciable extent independently of its competitors, its customers and ultimately of it consumers." In economic terms, one would, hence, say that a dominant position is one in which the firm has a "reasonably large" degree of market power.

In assessing whether or not a firm is dominant, the European Commission and the Court place great emphasis on the market share of the firm. Already in *Hoffmann-La Roche*, the Court held that very large market shares are in themselves, save in exceptional circumstances, evidence of dominance. While it is not possible to give an exact boundary, it is frequently stated that if the market share is above 50%, dominance is essentially presumed, while to date, there have been no cases where a firm with a market share of significantly less than 40% was found to be dominant. Of course, market shares are a very imperfect proxy for market power and, indeed, both the European Commission and the ECJ (the European Court of Justice) have frequently been criticized for attaching too much weight to market shares when assessing dominance, and for paying relatively little attention to other market characteristics, such as entry barriers. We will not deal with such issues here: we will deal with firms with large

[1] Case 27/76, *United Brands Co and United Brands Continental BV v. Commission* [1978] ECR 207, [1978] 1 CMLR 429, para. 65.
[2] Case 85/76, *Hoffmann-La Roche & Co AG v. Commission* [1979] ECR 461, [1979] 3 CMLR 211.

market share, presume dominance and focus on the question whether certain types of behaviour constitute an abuse.

Indeed, the text of Article 82 leaves this question open. A cursory reading might give the impression that the article deals primarily with straightforward monopolistic exploitation, hence, that the focus is on constraining monopolies. Such a narrow interpretation is also suggested by the French and German language versions of Article 82 that speak of "abusive exploitation". Obviously, in this case, there would be a clear contrast with Section 2 of the Sherman Act in the US that only seems to aim at preventing "monopolization" of markets, hence, at anti-competitive (exclusionary) behaviour directed at competitors. This is not to say that the US is not concerned about exploitative behaviour, rather in the US that behaviour is usually countered by sector-specific regulation. As a large portion of the literature in experimental economics originates in the US, such a sharp contrast would be relevant for this article. One the one hand, one should not expect the "monopolization" experiments to deal with exploitative behaviour, but rather be more focused on exclusionary behaviour; on the other hand, the experimental literature on regulation would be relevant for this paper as well. Fortunately for us, in practice the difference is not that large. EC competition law focuses also mostly on exclusionary behaviour, as was evidenced recently again by the choice of the Commission to launch the discussion on the reform of Article 82 EC by a Discussion Paper on exclusionary abuses, which it considers to be the priority area.[3]

Two aspects contribute to EU policy in this domain not being fundamentally different from policy in the US. First of all, in *Continental Can,*[4] the ECJ made it clear for the first time that Article 82 does indeed apply also to anti-competitive conduct that weakens competition that is already weak. Since then this has been confirmed on various occasions. For example, in *Hoffman-La Roche*, the ECJ wrote that abuse relates to taking "recourse of methods different from these of normal competition" with the effect of hindering the competition still existing in the market or the growth of that competition. Secondly, in practice, the European competition authorities have been reluctant to intervene in cases of alleged exploitation; see below. Consequently, although historical factors may explain a difference between the two sides of

[3] European Commission, *DG Competition discussion paper on the application of Article 82 of the Treaty to exclusionary abuses* (19 December 2005).
[4] Case 6/72 Europemballage Corp and Continental Can Co Inc v. Commission, [1973] ECR 215, [1973] CMLR 199.

the Atlantic,[5] in practice policy focuses on anti-competitive behaviour and so we will in this paper. We did not have to look, and did not look, into the literature on regulation.

To summarize, under Article 82 EC, firms are not forbidden from having market power, however, firms with significant market power are banned from using certain business strategies that other, non-dominant, firms are free to use. Presumably, the idea is that welfare and consumer surplus can be hurt if dominant firms would be allowed to engage in such (anti-competitive) practices. As will be clear, the challenge now is how to separate normal competitive behaviour from behaviour that should be classified as anti-competitive and, hence, be forbidden. On this issue, also see Vickers (2005).

Experimental economics could contribute to answering this question and, hence, to competition policy in three ways. First, if dominant firms have the ability to set prices above the competitive level, to sell products of an inferior quality, or to reduce the rate of innovation below the level that would exist in a competitive market, experiments can be conducted to see whether dominant firms will indeed engage in such practices. Secondly, where theories are too weak to distinguish normal competitive behaviour from anti-competitive conduct, experiments might help out to see which theory is applicable, or which is the most relevant one. Thirdly, since, when making their decisions, antitrust officials rely on a variety of formal and informal arguments, experiments may be useful to see to what extent these arguments hold water: if a certain type of behaviour is termed abusive, is it indeed observed in the experimental laboratory and, if so, does it reduce welfare or consumer surplus?

Conversely, antitrust cases may be a source of inspiration for experimental economics. Real life cases may demonstrate a variety of behaviours, which may or may not be profit maximizing, and one may investigate whether these behaviours are observed in the laboratory, and whether they can survive there. As we will see in this paper, there are plenty of allegedly abusive strategies that do not seem to have been formally investigated in the laboratory. The agenda of experimental economics seems to be influenced internally (by other experiments) and by developments of theory, but not so much by real life cases and problems, let alone by abuse cases. As we discuss more extensively in the concluding section, this is not

[5] The main goal of policy in the US was to prevent dominant firms coming into existence, whereas European industrial policy accepted that large firms may be necessary to successfully compete on world markets, as long as they are constrained.

to say that experimental economics is irrelevant for practitioners of competition law: since experiments may help in delineating the boundaries where various competition theories are relevant, they can be extremely relevant.

The remainder of the paper is organized as follows. In Section 2, we classify various types of abuses on the basis of the real life cases that have been dealt with by the European Commission and the ECJ. This allows addressing the second issue mentioned above: can antitrust cases serve as a source of inspiration for experimental economics? In Section 3 we review the experimental literature on anti-competitive behaviour, thereby addressing the first issue. We will see that few experiments are directly inspired by actual abuse cases; most of the experiments are motivated by theory or by other experiments, hence, the link with Section 2 is not very intense. Nevertheless, some experiments contain important messages for antitrust practitioners. In Section 4 we put together the various bits and pieces and draw our conclusions. Specifically, we answer the following questions: (i) Is there scope for further experiments within the sphere of abuse of dominance? (ii) Is the gap between experimental research results supplied by the literature and the demand of case handlers due to the inherent boundaries of experimental research as such? (iii) What are the lessons from this paper for using experimental research in antitrust enforcement?

2. ABUSES

As is well known, Article 82 EC has given rise to far fewer cases than the other major provisions of EC competition law, such as Article 81 EC or the Merger Control Regulation. Annex I provides an overview (as of March 2005) of the relevant case law of the ECJ/CFI and the decision practice of the European Commission under Article 82 EC (please bear in mind the methodological notes that accompany the table).[6]

That table indicates that, since the inception of the EC in 1958, there have been 50 relevant Commission decisions under this article, 26 of which were brought before the ECJ or CFI by way of judicial review (resulting in 9 annulments). In addition, there were 17 relevant ECJ

[6] Since then, three new cases have been dealt with: (i) *Astra Zeneca* (which concerns a new type of abuse in the management of IP rights), (ii) the Coca-cola case (traditional type, with exclusivity, etc., not unlike Van den Bergh Foods) and (iii) the opening of proceedings in the recent Telefónica case, involving margin squeeze.

decisions in preliminary ruling procedures, answering questions put by national courts. In order to be complete, the table should also include the decisions of national courts and NCAs.[7] This is however beyond the scope of the present research effort.

In passing, we may note that, in the Netherlands, in 2003 alone, the Dutch competition authority (NMa) decided not less than 159 cases relating to the Dutch equivalent of Article 82 EC. In only two of these cases (*CR Delta* (case 3353) and *LOI* (case 3125)), the NMa came to the conclusion that a dominant position might have been abused. The latter case concerns predatory pricing and, after a more thorough review, in 2005, the NMa concluded that its initial assessment had been mistaken: LOI did not have a dominant position. The former case is about non-linear pricing, and loyalty discounts in particular, and still has to be decided on appeal. Of the remaining 157 cases, in 79 the complaint was dismissed immediately, without any investigation; in the 78 other ones, that conclusion was reached after a brief investigation. We may conclude that there are frequent complaints about abuse, but that most often these apparently are not justified.

In light of the table in Annex I, there are five broad groups of practices that have been dealt with by the Commission and the ECJ/CFI over the years:

(i) pricing practices, including excessive prices, predatory pricing and price squeeze;

(ii) rebates, actually a subset of pricing practices, but which has received so much attention that it is worth treating it separately. It includes loyalty rebates, non-linear rebates and selective ('fighting') rebates;

(iii) discrimination, comprising discrimination between customers (exploitative practice) and discrimination towards competitors in a vertical integration setting (which also has an exclusionary impact);

(iv) various forms of refusal to deal, concerning either the supply of goods, of IP rights or information, of physical facilities (including the so-called "essential facilities" cases) or refusal to enter into standard cooperative (and pro-competitive) arrangements for the industry in question;

(v) various types of non-price contractual practices, including tying and exclusivity deals.

[7] Indeed, Article 82 EC is directly effective in its entirely and has been used by national courts over the past decades. As for NCAs, some of them were empowered to apply Article 82 EC before 2004, and they are now in any event with the entry into force of Regulation 1/2003 on 1 May 2004.

This classification has been established on the basis of available classifications, but it is not entirely in line with the most recent classification made by the Commission in its Discussion Paper of 19 December 2005 (above). The Commission Paper is concerned only with exclusionary abuses, which it further splits between predatory pricing, "single branding" (a term used to cover all matters of rebates and exclusivity links), tying and bundling as well as refusal to supply. In the preparation of this paper, all types of abuse – exclusionary but also exploitative or discriminatory (as the Commission calls them) – were surveyed. On the basis of the table in Annex I, the information can be recombined to match the classification of the Discussion Paper.

These groups of practices are discussed in more detail below.

2.1. Pricing practices (excluding rebates)

2.1.1 Excessive Pricing

This is the complaint that price is too high. Such complaints have to be dealt with under European antitrust law, but, as described above, there is no equivalent in US law. In any event, European competition authorities have repeatedly stated that they did not want to become price regulators, and accordingly few cases of excessive pricing have been pursued. The leading case remains the ECJ judgment in *United Brands.*[8]

In addition to the natural reluctance of competition authorities to engage into pricing inquiries, figuring out when a price is excessive remains a fundamental problem. As the ECJ stated, a price is excessive if it bears no more "reasonable relation to the economic value of the product".[9] Whereas prices practiced by the dominant firm are easy to observe, the economic value of the product is usually not so readily ascertainable. The key empirical difficulty in applying competition law to pricing issues lies in determining that value. Note that in an experimental setting, the economic value can be precisely controlled; hence, experiments might be directly relevant here.

[8] ECJ, Case 27/76, *United Brands* v. *Commission* [1978] ECR 207.
[9]See ECJ, Judgment of 13 November 1975, Case 26/75, *General Motors Continental* v. *Commission* [1975] ECR 1367 at Rec. 12, *United Brands*, *supra*, note 64 at Rec. 250 and Judgment of 11 November 1986, Case 226/84, *British Leyland* v. *Commission* [1986] ECR 3263 at Rec. 27.

The easiest way, in practice, of assessing the underlying economic value is to make a *price-price comparison*, that is, to look at prices practiced by non-dominant competitors on the same market or at prices of similar products in other — as much as possible competitive — markets.[10] These prices are usually as accessible as the prices of the dominant firm, and they can be thought to provide some indication of the economic value of the product in question. Such a comparative approach was endorsed by the ECJ in *Bodson.*[11]

This price-price comparison approach raises an interesting question for experimental economics. Roughly speaking, standard economics predicts that the price that a firm charges depends on the firm's cost structure, c, as well as on the market conditions, m, hence

(2.1) $$p = p(c, m)$$

The practical test for abusive pricing builds on p depending on m. One would like to know how strong this effect is according to experimental economics: is monopoly pricing substantially different from pricing in duopoly or oligopoly situations? It may be noted here that there are three experimental studies that analyse the pricing behaviour in oligopoly when the number of firms in the market varies: two early studies by Fouraker and Siegel (1963) as well as by Dolbear et al (1968), and a more recent study by Dufwenberg and Gneezy (2000). Unfortunately, none of these studies includes a monopoly so that they leave open the question whether or not monopoly pricing is substantially different from pricing in an oligopoly. In Section 3.1, we will return to this issue and refer to other experiments that illustrate that the extent to which monopoly power can be exercised depends on the institutional structure of the market and that the resulting price may well be lower than the one predicted by theory.

This comparative approach will be unavailable in a number of cases for lack of comparative data, that is, where the dominant firm enjoys a monopoly or no comparable competitive markets exist. In such cases, *United Brands* makes an inquiry into production costs, hence, a *price-cost comparison*, almost unavoidable. In its decision, the Commission had found, among others, that United Brands violated Article 82 EC (ex 86) by charging excessive prices for its bananas on the following grounds: there was a wide difference (up to 100%) in the prices charged by United Brands for Chiquita bananas on the Irish market — which were

[10]See M. Martinez, "Some Views on Pricing and EC Competition Policy", available at http://europa.eu.int/comm/dg04/index_en.htm at 7.
[11]ECJ, Judgment of 4 May 1988, Case 30/87, *Bodson* v. *Pompes funèbres des régions libérées* [1988] ECR 2479.

thought to cover costs — and elsewhere in the EC, and it recommended that United Brands reduce its prices.[12] This represents an interesting approach, but its value is limited since it involves a *comparison of prices* charged by a dominant firm in *different geographical markets*.[13] The ECJ annulled that part of the Commission decision, on the ground that the approach was flawed; the Commission could not simply rely on price comparisons without at least trying to support its findings by reference to the costs of production.[14]

In economic terms, in a price-cost comparison, one investigates what the costs, c, are in producing the product and next looks at the price cost margin, or Lerner index

$$(2.2) \qquad L = \frac{p - c}{p}$$

Once having calculated this index of market power, a judgment call has to be made: how high is L allowed to be, and what to make of fixed costs? This is not so easy, one gets into all kinds of accounting issues. It does not seem so obvious what the contribution of experimental economics could be in this domain. Of course, in the laboratory, one can investigate directly to what extent subject are engaging in monopolistic pricing, and what the constraints on such pricing might be; see Section 3.1 on monopoly pricing.

A third test for abusive pricing has been used by the Dutch competition authority and is inspired by the way regulators proceed. It involves an investigation of the rate of return. Consequently, this test does not look at prices, but at profits, or, more specifically, to returns on investment. One compares the ROCE (Return On Capital Employed) to the WACC (the Weighted Average Cost of Capital), the return that investors in the company would be satisfied with, as it provides an adequate return for the risk that is taken. The idea is that if the ROCE is much higher than the WACC, the price must be too high. As said, this method of *rate of return regulation* originates in regulated industries. We are not aware of a laboratory investigation of such a regulation.

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[12]Decision 76/353 of 17 December 1975, *Chiquita* [1976] OJ L 95/1 at 15-6. The Commission recommended that United Brands reduce its prices in Belgium, Luxembourg, the Netherlands, Germany and Denmark to a level at least 15% below its then current prices for Germany and Denmark.

[13]In the Decision, ibid., the Commission also mentioned that United Brands' prices were superior to those of its non-dominant rivals, which were still profitable. In *United Brands*, *supra*, note 64 at Rec. 266, however, the ECJ held that the difference to which the Commission referred to was not remarkable enough (some 7%) to support a finding of abuse.

[14]*United Brands,* ibid. at Rec. 251-2, 254 and 256.

2.1.2 Predatory Pricing

Predatory pricing is the practice in which the dominant firm charges prices that are so low as to drive competitors from the market, thereby aiming to obtain supranormal profits afterwards. There are conflicting theories about whether, or in which circumstances, the practice can be a rational business strategy; see Bolton et al. (2000) for an overview. As a result, predatory pricing has also attracted attention from experimentalists, who have tested the predictions of the various theories and have pitted these against each other; see Section 3.6.

Despite the theoretical interest in the phenomenon, predatory pricing seems to be rare in practice. The case law with respect to predatory pricing in Europe is limited (four cases), but it has attracted remarkable attention, the *Akzo* and *Tetra Pak II* cases having become leading precedents under Article 82 EC. The last two cases, *DP AG (Parcels)* and *Wanadoo Interactive*, date from 2001 and 2003 respectively and are likely also to have an impact, since they pick up on suggestions made in the *Notice on Access Agreements* in 1998 and update the law in the context of multi-service industries (including network industries). Until then, the law was reasonably clear and had remained unchanged since *Akzo*. According to the case law, a price is predatory if it is below marginal cost (AVC), or if it is below average cost (ATC) and is part of an explicit plan to eliminate a competitor. Note that the latter respect implies that predation cannot be inferred from market and cost data alone: one needs to know the *intentions* of the firm. For experimental economics, this has the consequence that the strategy method should be employed to test the practice.

In *Wanadoo Interactive*, the Commission conducted a very detailed analysis of the costs of Wanadoo Interactive. It applied the abuse test set out above, yet even where the Commission found that Wanadoo did not recover AVC, it still inquired into intent. Indeed a key factor in the decision was the evidence that Wanadoo intended to drive its competitors out of the market. Such evidence was found in explicit statements contained in company documents[15] and in an objective analysis of Wanadoo's strategy.[16] Furthermore, none of the justifications

[15] Ibid. at Rec. 110-141.
[16] Ibid. at Rec. 274-299. As we ourselves note, indeed predation is more complex than just a price test.

put forward by Wanadoo for its strategy was accepted by the Commission.[17] A number of pronouncements are interesting, where the Commission adopted a broader perspective on predation than what is sometimes found in economic theory. For instance, the Commission held that behaviour less radical than the exclusion of competitors, i.e. mere inhibition, could also constitute predation under competition law.[18] Similarly, according to the Commission, it was not necessary to prove that Wanadoo would, or could, recoup its losses,[19] although it did show that the relevant market was characterized by entry barriers, which do make recoupment possible.[20] In the US, the possibility of recoupment is an integral part of the test for predation.

The economic literature has focused on the question whether the cost test as described above is suited to separate prices that are "really" predatory (i.e. profitable only because of induced changes in the behaviour of competitors or of the market structure) from prices that are normally competitive. The literature argues that the test is misspecified: under a variety of conditions, a firm will wish to charge prices that are below cost. Secondly, there is an extensive literature dealing with the question under which circumstances predatory pricing can be a rational business strategy. For more details, we refer the reader to Bolton et al. (2000). The main lesson coming out of that literature is that market structure may be more important than cost data, hence, that the test for predation should focus on, or at least also include this aspect; in particular, recoupment of the initial losses will be possible only if there are entry or re-entry barriers. Consequently, only in these cases can predation be profit maximizing.

In contrast to the Chicago view that predation will always be irrational, hence, that the practice should not be of concern to antitrust agencies, the more recent economics literature has identified a certain number of situations (models) in which predation could indeed be rational. The experimental economics literature could make contributions to answering two questions:

(i) Does predation happen in the cases in which theory predicts it could happen?

(ii) Does predation happen in other situations?

We will return to these questions in Section 3.6. We will see that the answers are ambiguous: predatory pricing can be observed in the laboratory, but not always in those cases where it is

[17] Ibid. at Rec. 305-331.
[18] Commission decision of 16 July 2003, *Wanadoo Interactive*, available on the website of DG COMP, Rec. 266.
[19] Ibid. at Rec. 333-335.
[20] Ibid. at Rec. 336-367.

predicted by theory. One should, however, be careful with interpreting the experimental results: economists do not always adopt the same definition of predation as the one that is used in EU case law.

2.1.3. Price squeeze

Price squeeze, also called margin squeeze, refers to the situation where an entrant has to buy an input from the dominant firm in order to compete with it on the output market. If the dominant firm sells to the competitor at a price that is higher than the price it charges consumers for the final product, clearly even an efficient competitor faces a very difficult situation. The Commission defines price squeeze as "an insufficient spread between a vertically integrated dominant operator's wholesale and retail charges… especially where other providers are excluded from competition on the downstream market even if they are at least as efficient as the established operator"[21].

There are only two relevant cases of price squeeze, namely *Napier Brown* and *Deutsche Telekom*. The latter case illustrates very well the current state of the law. The Commission decided that DT's wholesale and retail charges for access to the local loop amounted to a margin squeeze. That is, the spread between DT's wholesale tariffs for unbundled access to its subscriber lines and the weighted average of its corresponding retail services tariffs (analogue, ISDN and ADSL connections) left DT's competitors an insufficient margin to compete for retail subscribers, as the spread was lower than DT's own downstream product-specific costs.

2.2. Rebate practices

The practice of the Commission and the case-law of the ECJ/CFI contain a remarkably high number of cases concerning rebate practices. EC law remains relatively strict on this issue to this day, allowing dominant firms very little margin to offer rebates to their customers, except for linear rebates which are directly linked with cost savings on the volume of the order. Recent decisions of the CFI in *British Airways*[22] and *Michelin II*[23] have only confirmed the state of EC law on the matter, despite the criticism levelled at earlier cases.

[21] Ibid. at Rec. 108.
[22] CFI, Case T-219/99, *British Airways* v. *Commission*, not yet reported.
[23] CFI, Case T-203/01, *Michelin* v. *Commission* [2003] ECR II-4071.

2.2.1 Non-linear pricing (Quantity Discounts)

At stake in *Michelin II*, among others, is the question whether quantity discounts can be anti-competitive. A similar issue arose in the Dutch case *CR Delta*, already referred to above, and as that case is simpler, we use it here as an illustration.

CR Delta (www.cr-delta.nl) is a farmer cooperative trading in bull seamen. In *CR Delta*, the NMa objected to a very simple discount scheme: if a farmer's annual expenses exceed certain thresholds, he gets a certain discount (ranging from 1% to 5%) over the entire volume. In general such discount schemes are allowed if they can be justified on the basis of cost savings. The NMa, however, was not convinced of this and argued that, in fact, the discount scheme functioned as a loyalty scheme. In particular, it considered the period (1 year) and the cumulative nature (the fact that discount is given over the entire volume) to be anti-competitive. In its decision, the NMa did not refer to an economic model to substantiate this claim, however, and interesting for this paper, it refers to a behavioural aspect: farmers that are close to a threshold would be induced to stay with the dominant company in order to reach the next level. It would seem interesting to test whether this effect is real, or more generally, to investigate under what circumstances quantity discounts induce loyalty.

2.2.2. Loyalty rebates

Loyalty rebates increase the costs of switching to a competitor and a dominant firm is in principle forbidden from using such rebates. *CR Delta* also involved a loyalty rebate: a farmer that bought of least 90% of its supplies from CR Delta received a discount of 1%, a farmer that bought only from CR Delta got a discount of 2%. Interestingly, the scheme was never implemented, but it was announced and NMa argued that the announcement as such was anti-competitive. In this respect there is a relation with announcement effects and vapourware; we are not aware of experiments related to this practice. More generally, loyalty schemes play, at least in part, on certain consumer characteristics, hence, they might be a fertile ground for experimental economics. Again, we are not familiar with experimental literature investigating these aspects.

Interestingly, CR Delta was also offering a third type of rebate scheme, which was claimed to induce foreclosure. The company is offering two types of products: tested seamen of known quality and seamen of bulls that has not yet been used for breeding, or very little, and that still needs to prove itself. CR Delta needs the cooperation of farmers to test seamen of the latter type and, if successful, to possibly transform it into a profitable product on the tested market. To induce farmers to engage in such testing, it gave a reduction of 10% on tested seamen to those farmers that were willing to do a certain amount of testing. The price reduction was viewed as a reward for participation in the testing program, but the NMa argued that it induced "testers" to buy from CR Delta, hence, that it foreclosed the market for competitors. Obviously, if the reward for testing had been lump sum, farmers would indeed be more inclined to buy from competitors. Again we do not know of papers in the experimental economics literature dealing with this or similar pricing strategies.

2.2.3. Selective rebates ('fighting' practices)

There are two cases of 'fighting' practices, where the dominant firm systematically set out to underbid its competitors, namely *Irish Sugar*[24] and the *Cewal*[25] case. In the former case, the dominant Irish sugar producer and packer granted selective rebates to customers who were importing sugar from other Member States and offered rebates to customers of competing packers on condition that they source all of their needs from it. In the latter case, the various liner conferences reacted to the entry of new competitors on the Europe-West Africa cargo lines by departing from its tariff to offer cargo services at the same rate as the competitors at about the same sailing date (so-called "fighting ships").

2.3 Discrimination

In the previous Section, we already discussed second-degree price discrimination. In this Section, we focus on first-degree price discrimination (charging different prices to different costumers) and third-degree price discrimination, which is charging different prices in different markets. EC competition law deals with three broad types of discrimination:

(i) First-degree price discrimination: Discrimination among the customers of a dominant firm (see the classical cases *United Brands* or *Michelin I*). These are

[24] Decision of 14 May 1997, *Irish Sugar* [1997] OJ L 258/1.
[25] Decision of 23 December 1992, *Cewal, Cowal, Ukwal* [1993] OJ L 34/20, upheld on this point by the CFI and the ECJ.

cases where price discrimination is used to extract the most profit from individual customers who are in the eyes of the competition authority in a similar position and should thus pay similar prices.

(ii) Third-degree price discrimination: A sub-set of the former type, which is more likely to fall foul of EC competition law, is discrimination among customers according to the Member State where they are located. This type of practice, even if it may be linked to differing preferences amongst national markets in various Member States, runs against the market integration objectives of the EC Treaty. A pre-eminent example of this is found in the *Tetra Pak II* case.

(iii) Another sub-set of first-degree price discrimination has appeared in recent times: here a vertically-integrated firm with a dominant position on, say, the upstream market, would discriminate in favour of its own downstream subsidiary and against the competitors of that subsidiary. The objective there is no longer just exploitation, but also exclusion. See here *HOV SVZ/MCN* for an example, where the German railway operator Deutsche Bahn applied different prices for the transport of containers from seaports to German destinations, favouring German ports (Hamburg, Bremen), which it served on its own, over Benelux ports (Antwerp, Rotterdam), which were served via a joint venture with other railway operators.[26]

The economics of (monopolistic) price discrimination is well understood: if it leads to expanding the size of the market, it is most likely to be welfare improving; otherwise most likely it is not. Article 82 EC forbids any price discrimination by dominant firms; hence, the law might be more strict than is desirable from the point of view of economic welfare. EC competition law is, however, not only guided by that objective, but also by the –sometimes-prevailing – objective of market integration. For a discussion on price discrimination in the experimental economics literature, see Section 3.2

2.4 Refusal to deal

Cases where a dominant firm refuses to supply an existing customer, or a potential competitor, probably offer the largest contrast between EU and US policy. Ordering the dominant firm to supply is a strong interference with business freedom and in this domain

[26] Decision of 29 March 1994, *HOV SVZ/MCN* [1994] OJ L 104/34, upheld by the CFI.

European policy has typically been much more interventionist. The figures in Annex I indicate that refusal to deal is the largest group of practices dealt with under Article 82.

Refusal to deal cases can be split in a few sub-categories:

(i) there are the "classic" cases where a dominant firm ceases to supply its competitors (*Hugin, Hilti*) or its established distribution channels (*United Brands*, *Commercial Solvents*);

(ii) refusal to grant access to production facilities, including the so-called "essential facilities" cases. These were popular in the 1990s and include precedents such as *Bronner, London European/Sabena* and *Sea Containers / Stena;*

(iii) refusal to grant access to IP rights and other valuable information. These include cases such as *Magill, IMS Health* and the recent Commission decision in *Microsoft;*

(iv) refusal to cooperate in normal industry practices, such as interlining (*British Midland*).

It is in this domain that the special responsibility towards competition that a dominant firm in Europe is said to have is playing an important role. In *Commercial Solvents*, for example, a pharmaceutical firm cancelled orders for a certain raw material, presumably expecting to be able to buy that material cheaper elsewhere. When the alternative supplies did not prove satisfactory, the firm turned to the original supplier, a dominant firm, again, but that supplier had meanwhile decided to vertically expand into the downstream product market, hence, it no longer wanted to supply. The ECJ ruled that thereby the dominant producer abused its dominant position as its strategy could eliminate all competition from the market. *Hugin* is essentially similar: a manufacturer no longer wanted to supply spare parts to a retailer is it wanted to build up its own spare parts business. In *United Brands*, UBC wanted to punish a distributor for the fact that it had participated in a promotional campaign of a competitor of UBC. According to the ECJ, the counter-measure of no longer supplying this distributor was not proportional and, hence, abusive. It is remarkable that, in all these older cases, there is little attention to efficiency arguments: the dominant firm is simply said to have a responsibility to keep competition alive.

Essential facility cases are special cases of refusal to deal: a competitor needs access to the upstream production facilities of the dominant firm in order to be able to profitably compete

on the downstream market. The question now is under what conditions, and against which terms, the dominant firm should be forced to share its facilities. The so-called "essential facilities doctrine" that aims to answer this question originates in the US, and has been extensively criticized there; see the seminal article by Areeda (1990) [27] and the recent ruling of the Supreme Court in *Trinko* v. *Verizon Communications*.[28] Three important recent EU cases are *Magill*, *Bronner* and *IMS Health*.

In *Magill*[29] broadcasters were not willing to hand over their programming data to a publisher who wanted to publish a complete programming guide (as opposed to the single-broadcaster guides which the broadcasters themselves issued). The ECJ argued that the refusal to supply prevented a new product, for which there was apparent demand, from coming on the market, hence, that the refusal to supply constituted an abuse according to Article 82(b). This decision has been criticized for being too interventionist and for eliminating firms' incentives to invest. In the later cases, *Bronner* and *IMS Health*, the ECJ took a more reserved stance and sided more with the holder of the facility to which access was claimed.

In *Bronner*[30] the ECJ shows its awareness of the investment issue and it refuses to grant a competitor access to the facilities of a dominant firm. *Bronner* deals with a small newspaper company, with low circulation, that wants to get access to the nationwide distribution system of a larger competition. Bronner argues that its circulation is too small for it to have its own viable system, hence, that it should get access to the unique nationwide distribution system, that of its competitor. The ECJ, in essence argues that, given the current market shares, the claim might be true, but that this fact does not justify getting access. If Bronner would have an equal market share as the leading firm, then a nationwide distribution system would be viable for Bronner itself; hence, the competitor should not be forced to share. It has been argued in Bergman (2000)[31] that this Bronner-test constitutes a formidable hurdle for new entrants: it may simply not be feasible to reach a comparable market share within a reasonable time frame.

[27] P. Areeda, Essential facilities: an epithet in need of limiting principles, (199) 58 *Antitrust Law Journal* 841.
[28] Docket No. 00-682 (13 January 2004).
[29] Case C-241, 241/91P *RTE & ITP v. Commission*, [1995] ECR I-743, [1995] 4 CMLR 718.
[30] Case C-7/97 *Oscar Bronner GmbH & Co KG v. Mediaprint* [1998] ECR I-7791 4 CMRL, 112
[31] M. Bergman, The Bronner case – A turning point for the essential facilities doctrine? [2000] ECLR 59.

The latest instalment in this line of case-law was *IMS Health*, issued by the ECJ in 2004.[32] In that case, a firm called NDC was trying to invoke EC competition law to obtain an order forcing IMS Health to license its "brick structure", i.e. the geographical breakdown in the reporting format used in the IMS report on the sales of pharmaceutical products. This structure was protected by copyright, and IMS refused to license it, preventing NDC from entering the market to compete with the dominant provider IMS. The ECJ restated the *Bronner* test, namely that

> "in order for the refusal by an undertaking which owns a copyright to give access to a product or service indispensable for carrying on a particular business to be treated as abusive, it is sufficient that three cumulative conditions be satisfied, namely, that that refusal is preventing the emergence of a new product for which there is a potential consumer demand, that it is unjustified and such as to exclude any competition on a secondary market."[33]

The ECJ also elaborated on the "new product" condition, stating that the competitor seeking access to the intellectual property must not "intend to… essentially duplicat[e] the goods or services already offered… but intend… to produce new goods or services not offered by the owner of the right and for which there is a potential consumer demand." After *IMS*, it seems unlikely that competition law will be often used to force access to the facilities of dominant firms.

Note that *IMS* is simply an example illustrating the general conflict between Intellectual Property Law and Competition Law and the trade-off between investment and diffusion of new ideas and technologies. It seems that this conflict area might be a fruitfull one to study for experimental economists.
At this point we are not aware of experimental work studying refusal to deal.

2.5 Non-price contractual practices

A number of non-price contractual practices have been found abusive over the years. Here as well, the *Tetra Pak II* case provides an illustration of a large number of such practices. The main ones are:

(i) tying and bundling, dealt with in greater detail below;

[32] ECJ, Case C-418/01, *IMS Health* [2004] ECR I-5039.
[33] At para. 38.

(ii) exclusive deals, in particular agreements whereby the dominant firm becomes the exclusive supplier of the other contracting party (*Soda Ash*);

(iii) display exclusivity, especially in the well-known *Van den Bergh Foods* case involving ice-cream freezers.

In the 1970s, there were a number of cases where it was alleged that the enforcement of IP rights (essentially to prevent parallel trade) constituted an abuse of dominant position (*Deutsche Gramophon*, *Parke Davis*). However, the ECJ always stood by its position that the mere exercise of IP rights did not constitute an abuse in the absence of concrete evidence of anti-competitive effect.

As mentioned in the Introduction, Article 82 specifically lists tying as a possible abuse. There is a rather large recent economics literature dealing with the question of whether, and in which circumstances, tying might be bad for welfare. Three leading cases in this domain are *Hilti*, *Tetra Pak II*, and *Microsoft*. Quite surprisingly, despite the considerable interest by economic theorists in issues related to tying and bundling, we are not aware of experimental work that deals with this topic.

3. EXPERIMENTS ON ABUSING MARKET POWER

We are not the first attempting to review the experimental literature that contributes to industrial organization with emphasis on antitrust issues. There are at least two other articles that should be mentioned here. The most comprehensive overview to date is Wellford (2002). Many of the experimental studies she reviews, however, are not directly related to the narrower focus of our overview. Nevertheless, there are some general conclusions that are interesting to be reiterated here (see p.41 in Wellford's article): First, institutional form matters more than theory implies. For example, under certain institutional settings the competitive outcome is more robust than theory would predict it to be. Second often market power is not exercised to the full extent. Even single seller markets do not necessarily lead to monopoly outcomes and, although sellers with market power may set prices at supracompetitive levels, they do not always restrict production to the level predicted by theory. Third, Wellford points out that most laboratory studies to date have omitted two features that are crucial to antitrust issues, namely possible entry and the existence of antitrust

agencies. Thus, it is likely that results are biased towards more collusive outcomes, or outcomes that violate antitrust laws. In the light of these two omissions, it is especially worthwhile mentioning that many market environments that Wellford reviewed are quite competitive.

Another, more personal, review is Davis and Wilson (2002), who propagate the incorporation of experimental work into the development of antitrust policy. We agree with their assessment that appropriately designed experiments can uniquely provide important insights relevant for competition policy. They illustrate this point by reviewing some of their experimental work on detecting price fixing in sealed bid auctions, enforcement standards for merger-specific efficiencies and differentiated product competition and the antitrust litigation model. Our paper focuses on the abuse of market power by dominant firms and is complementary to theirs.

In order to economize on space, when we review the experimental literature on abusive practices, we will usually not provide details on the underlying economic theories; for this we refer to, for example, Motta (2004).

3.1 Monopoly pricing

Monopoly pricing has been tested in the lab using a variety of trading institutions; most prominently posted-offer markets[34] and to a lesser degree double oral auctions[35] and posted-bid monopolies.[36,37] Smith (1981) tests these three institutions and finds that monopolists in

[34] See Smith (1981), Isaac et al. (1984), Coursey et al. (1984), Harrison and McKee (1985), and Harrison et al. (1989).
[35] See Smith (1981) and Smith and Williams (1989).
[36] See Smith (1981).
[37] Let us very briefly explain these institutions (for more details see e.g. Davis and Holt 1993). Each of these markets are divided into a series of trading periods. Subjects are assigned the role of a seller or a buyer. At the beginning of a period buyers are assigned unit valuations and sellers unit costs. Buyers' profits are given by the difference between the unit value and the contract price whereas sellers' profits are given by the difference between the contract price and the unit cost. In a double oral auction buyers call out bids at which they are ready to buy a unit whereas sellers call out offers at which they are ready to sell a unit. A buyer can accept any standing offer and a seller can accept any standing bid at any time. A posted-offer market follows a two-step procedure. First, sellers privately select a price for the current trading period and indicate the maximum number of units they are willing to sell at this price. Then these prices (but not the maximum number of units) are made public to the buyers and the other sellers. Then buyers are randomly and sequentially given the opportunity to make as many purchases as they like at any seller who has not yet sold his maximum number of units. When one buyer stops shopping another buyer is called to do his purchases.This continues until each buyer got the opportunity to make purchases or until all units on offer are purchased. A posted-bid market works like a posted-offer market with the roles reversed. That is, in a posted-bid market it is the buyers who post bids at which they are willing to buy units from sellers.

double-oral and posted-bid markets are not able to exercise market power to the extent predicted by theory. In contrast to this, in the one posted-offer market reported in Smith (1981), the monopolist performs as predicted. To illustrate these results, Holt (1995) computes the "monopoly effectiveness index"

(3.1) $M = (\pi^a - \pi^c)/(\pi^m - \pi^c)$

π^a : actual profit, π^c : profit at the competitive equilibrium and π^m : monopoly profit

for the final period in the markets reported in Smith (1981).[38] The results are as follows: double auction monopoly: $M = 0.36$; posted-bid monopoly: $M = 0.15$; posted-offer monopoly: $M = 1.0$. Plott (1989) remarks that the likely reason for the failure of the monopolist in the double auction to exercise market power is the fact that buyers in this institution do not behave passively as price takers but engage in withholding purchases. This behaviour causes the monopolist to price more cautiously.

Holt (1995) also computes the monopoly effectiveness index M for other posted-offer monopoly experiments. These experiments vary the cost structure (decreasing or increasing), the type of buyers (human or simulated) and the level of experience of subjects. Holt finds that the index varies considerably. It is highest in the study by Harrison, McKee and Rutstrom (1989) with experienced subjects, simulated buyers and a decreasing cost function where $M = 0.78$ and it is lowest in another treatment of the same study where all features of the design are the same except that subjects are inexperienced. For the latter treatment Holt computes $M = 0.44$.

In a more recent contribution Engle-Warnick and Ruffle (2004) analyse the effects of buyer concentration on the pricing of a monopolist. They construct experimental posted-offer markets in which a monopolist faces either two or four buyers. They find that markets with two buyers achieve significantly lower prices, sometimes even below competitive levels, than those with four buyers. In particular they report $M = -1.88$ for the two-buyer treatment and $M = 0.005$ for the four-buyer treatment. With the help of additional control treatments they are able to isolate the source of the difference. They find that the lower prices in the two-buyer treatment is due to the monopolist pricing more cautiously when there are fewer buyers in

[38] Clearly, $M = 1$ ($M = 0$) means that the monopolist achieves monopoly (competitive) profits.

order to avoid costly losses in sales. Buyer concentration may thus be an effective source of countervailing power.

Holt (1995, p.381) summarizes the results of monopoly experiments as follows: "Pricing in posted-offer monopolies is higher than in double auction monopolies. Posted-offer monopolists are generally able to hold prices well above competitive levels, but on average, profits are significantly below theoretical monopoly levels. Monopoly pricing in posted offer markets is facilitated by experience and by constant or decreasing costs. The effect of using simulated buyers, as compared with a small number of human buyers, is probably to facilitate monopoly pricing a little." In the light of the results by Engle-Warnick and Ruffle (2004), one would have to add that monopoly pricing is facilitated by markets with a higher number of human buyers.

Given the clear deviations from profit maximization reported above, it is interesting to refer to the work by Kahneman, Knetsch and Thaler (1986). In this study the authors collect data from telephone surveys to analyse 'community standards of fairness for the setting of prices and wages.' Summarizing the results of various administered questions these authors find "that many actions that are both profitable in the short run and not obviously dishonest are likely to be perceived as unfair exploitations of market power" (p.737) and that "even in the absence of government intervention, the actions of firms that wish to avoid a reputation for unfairness will depart in significant ways from the standard model of economic behaviour." (p.738). The conclusion, hence, is that "considerations of fairness or concerns for long-run reputation, may act as a constraint on profit maximization".

Finally, we briefly mention that there is also a small experimental literature on durable-good monopolists that is fuelled by Coase's (1972) seminal contribution. Coase argued that product durability can constrain a monopolist's power as consumers might be willing to delay purchasing in the expectation that the monopolist will reduce its price in later periods. Later theoretical contributions have tried to isolate circumstances under which this is indeed the case. Experimental contributions to this discussion include Güth, Ockenfels and Ritzberger (1995), Rapoport, Erev, and Zwick (1995), Reynolds (2000), Cason and Sharma (2001), and Güth, Kröger and Normann (2004).[39] We only mention some results of this literature.

[39] These studies analyse a wide range of features including one buyer vs. several buyers; one period vs. several periods; finite vs. infinite horizon; complete vs. incomplete information, same discount factor for the seller and buyer(s) vs. different discount factors for the seller and buyer(s).

Arguably, the most interesting result is that contrary to Coase's conjecture sometimes durability fails to constrain monopoly power in that prices for a durable good are *higher* than for a nondurable good (Güth et al. 1995, Reynolds 2000). Second, often trading extends over more periods than predicted due to demand withholding (Cason and Sharma, 2001). Third, durable-goods experiments are rather complex such that without a sufficiently high number of repetitions, observed prices may fail to conform to comparative statics predictions (Güth et al. 1995).

3.2 Price discrimination

The only paper analysing price discrimination by a monopolist we are aware of is the paper by Hudson and Lusk (2004) who report on "a Web-based experimental learning tool to assist instructors in conveying the central principles of [third-degree] price discrimination under asymmetric information." Unfortunately, given its purpose, the sample size is quite small (13 subjects). Furthermore, there is no comparison with a treatment in which price discrimination is banned and monopolists are forced to set uniform prices. Nevertheless, let us very briefly report on the results of this paper.

In the experiment, subject monopolists are told that they are sellers of a higher quality and a lower quality good and that there is a population of ten simulated consumers, six of which prefer the lower and four of which prefer the higher quality product. So there is asymmetric information. Furthermore, subjects are told that production costs differ for the two products and that their objective is to price the two products in order to maximize profits. Surely, the optimal solution is to price the lower quality good at a price that extracts the maximum willingness to pay from the "lower" consumers and to price the higher quality product such that the "higher" consumer is left with some "information rent" such that all "lower" ("higher") consumers purchase the lower (higher) quality good.

Hudson and Lusk (2004) only present graphical results of their small sample of 13 subjects. In any case, subjects appear to learn very quickly to set prices that are very close to the optimal levels. It turns out, however, that convergence to the optimal price of the lower quality good is somewhat quicker and more complete than convergence to the optimal price of the higher quality product where observed prices are at times too low.

3.3 Price Discounts

There seems to be only a handful of experimental papers that deal with price discounts—and most of them do not concentrate on abusive practices. For example Davis and Holt (1994, 1998) deal with price discounts in posted-offer markets. The later paper is particularly interesting as it shows the effect and the interplay of conspiratorial discussions among sellers, secret price discounts and ex-post information about other sellers' individual sales quantities. But both papers implement sellers of equal size and the second concentrates on collusion. In Davis and Milner (2004) different rebate schemes that participants can choose from are exogenously implemented and the focus, again, is not an antitrust issue.

A relevant contribution to the topic of price discounts granted by a dominant firm is the study by Normann et al. (2004). This paper studies whether or not—and if so, under what circumstances—large buyers (those who potentially purchase more than others) are granted price discounts. The authors draw on the theoretical literature that states that whether such discounts are observed depends, among others, on the curvature of the total surplus function over which the parties bargain. (Here, the total surplus function is equal to total benefits minus total costs as a function of the quantity sold to buyers who reach an agreement with the seller). Theory predicts that price discounts are granted to large buyers in case the total surplus function is concave; that no discounts are granted to large buyers in case the total surplus function is linear; and yields a variety of outcomes (including one with no discounts) in case the total surplus function is convex.

Normann et al. (2004) test these predictions in markets in which large and small buyers bargain simultaneously with a single seller. Here, large buyers' demand is twice as high as the demand of small buyers and different shapes of the total surplus function are achieved by varying the seller's marginal cost function. The timing is such that first each buyer makes a bid that represents the price at which she is willing to buy units, with buyers not being allowed to bid different amounts for different units. The seller, which is not capacity-constrained, observes each bid and then decides whether or not to accept it. Note that in this set-up there are no efficiency reasons that would suggest granting discounts.

The experimental results strongly support the theory. As predicted, large-buyer discounts are observed only when the total surplus function is concave. The main deviation from theory is

that the absolute level of the bids sometimes differs from the theoretical predictions. Normann et al. (2004) do not offer specific policy implications of their results. However, it seems safe to say that their results support the view that under certain circumstances the ability of firms (even monopolists) to charge high prices depends on buyers' bargaining power.

3.4 Third degree price discrimination: zone pricing

Deck and Wilson (2003) report results of an experiment regarding zone pricing. They concentrate on the gasoline market and refer to zone pricing as the practice of refiners setting different wholesale prices for retail gasoline stations that operate in different geographic areas or zones. They point out that this is an important public policy issue: refiners claim that they use zone pricing in order to be competitive with local rivals, while antitrust practitioners argue that zone pricing benefits the oil industry and harms consumers. Relevant for the current overview are the experiments on the competitive effects of zone pricing on consumers, retail stations, and refiners and the comparison with the proposed policy prescription of uniform wholesale pricing to retailers.[40]

In their experiments there are four refiners that each produce a specific brand of gasoline and four retailers that each operate two gas stations. More precisely, each retailer operates one station in the "clustered" area at the centre and another station in an "isolated". Hence, the centre area is contested, while each refiner/retailer combination is dominant in one isolated area. Simulated final consumers are uniformly distributed on the grid with each consumer having inelastic unit demand. The experiments have a rich design and we will only describe the main features. In the baseline treatment, refiners have the ability to set geographically different wholesale prices, that is, each retailer observes two location-specific wholesale prices, but they cannot shift inventory between locations. In the uniform pricing treatment, the refiners must charge the same wholesale price to each station selling its brand, hence, each retailer observes only one wholesale price that applies to both of its locations. The experiment

[40] The authors also investigate the "rockets and feathers" phenomenon (the perception that retail gasoline prices rise faster than they fall in response to movements in the world price for oil) as well as the issue of structural separation, i.e. the legal restriction that refiners and retailers cannot be vertically integrated. Concerning the latter, the authors compare behaviour in the baseline treatment with a treatment in which refiners and their retail gasoline stations are vertically integrated. They find that vertical integration eliminates the double mark-up of prices such that all buyers, in clustered or isolated areas, pay significantly lower prices and have substantially higher utility when stations are company-owned. Thus, the conclusion is warranted that, in the laboratory, legislation that bars refiners and retailers from becoming vertically integrated harms consumers.

lasts for 600 periods (of 1.7 seconds each), with both refiners and retailers being allowed to adjust their prices at any time. Retailers and refiners observe all current retail prices, including those set by rival outlets, but only the refiner and the associated retailer know the current wholesale prices.

Deck and Wilson report the following findings. First, under both zone and uniform pricing, retail transaction prices are statistically higher in the isolated areas than in the clustered area. Second and more important for this paper, when compared to zone pricing, uniform wholesale pricing increases retail transaction prices significantly in the clustered area, while it has no significant effect on transaction prices in the isolated areas. Uniform pricing actually reduces the welfare of those buyers residing closest to the clustered centre area and of those who are on the border of the centre and the isolated areas. Interestingly, Deck and Wilson find that refiners' profits are unaffected by the uniform pricing: it is the retailers that extract surplus from the consumers. The following explanation is offered: "Under uniform pricing, the refiners offer a price that is above the centre area zone wholesale price and below the isolated area zone wholesale price. These refiners are balancing extracting economic rents from the isolated stations and remaining viable in the competitive, centre area. Thus, a refiner's gains in the centre area, due to higher wholesale prices, are offset by reduced earnings in the isolated markets where wholesale prices have decreased and profits are unchanged. With uniform pricing, the retailers do not gain a profit margin in the centre area but do receive a larger margin in the isolated regions where retail prices are unchanged but wholesale prices have declined." (p.23)

To summarize, contrary to claims put forward by proponents of uniform pricing legislation, under uniform pricing consumers lose when compared to a zone-pricing regime. In this respect, the experiment confirms the general view of economists that one should not forbid price discrimination too soon.

3.5 Entry deterrence

3.5.1 Limit Pricing

A firm engages in limit pricing if it sets its price and output so that there is not enough demand for another firm to profitably enter the market. Note that consumers benefit from

lower prices in the phase of limit pricing, but that this advantage might be offset by higher prices due to less competition if entry is successfully deterred. Also note that, in contrast to predatory pricing (that focuses on driving existing competitors out), limit pricing aims at preventing entry altogether. As far as we know, there are no actual cases involving complaints of limit pricing.

Cooper et al. (1997a and 1997b) test a game based on the Milgrom and Roberts (1982) model of limit pricing. In this two-period model, an incumbent is confronted with a potential entrant. The market is one with a homogeneous good and linear demand. The privately known cost of the incumbent is either high or low (with equal probability) and entry is only profitable if the incumbent's costs are high. In the first period, only the incumbent is in the market. After having observed the price chosen by the incumbent, the potential entrant decides whether to enter or not. If he stays out, the incumbent remains a monopolist; otherwise the market becomes a Cournot duopoly. Due to the uncertainty about the incumbent's cost (that can only be inferred indirectly by the entrant, if at all, through the incumbent's first-period price), there is room for signalling through limit pricing in the first period.

Cooper et al. consider two main treatments: one in which the entrant has "high", and one in which it has "low" costs. The game with a low-cost entrant has a unique (pure strategy) separating equilibrium: the low-cost monopolist sets a first period price below its myopic monopoly price and so low that it cannot be matched by the high-cost monopolist, hence, there is limit pricing in order to deter entry. Consequently, in equilibrium, the entrant correctly infers the monopolist's cost and enters if and only if the monopolist is weak. Note that entry occurs if and only if it is efficient. In the game with a high-cost entrant, the parameters are such that, given the prior distribution on cost, the entrant finds it optimal to stay out. Now multiple equilibria exist. Along with pure-strategy separating equilibria, there are pooling equilibria in pure strategies in which the high-cost monopolist engages in limit pricing to deter entry. In these pooling equilibria, the high-cost monopolist charges the same price as the low-cost monopolist, nothing about cost can be learned from first-period prices, and the potential entrant decides to stay out. Note that in this case, production is not always efficient.

The main finding of the Cooper et al. study is that "limit pricing reliably emerges in both types of games as the theory predicts with play consistently converging on a particular

equilibrium as a function of the underlying treatment conditions" (Cooper et al. 1997a, p.663). The patterns of convergence are particularly interesting. Cooper et al. report: "Convergence to equilibrium follows a characteristic history of play. Initially, independent of potential entrants' costs, monopolists largely ignore any threats of entry. Given that entrants can then easily infer the monopolist's type, entry rates on high-cost monopolists quickly rise, fostering attempts to pool with low-cost monopolists who are not being entered on. In games where pure-strategy pooling equilibria exist, play settles into an 'efficient' pooling equilibrium in which low-cost monopolists produce at their full-information output level and high-cost monopolists imitate them, forestalling entry. In games where no pure-strategy pooling equilibria exist, these 'pooling' efforts are shattered by increased entry that induces low-cost monopolists to separate to higher output levels" (p.663) In all, Cooper et al. show that the strategic use of limit pricing to deter entry does emerge in the laboratory.

Müller et al. (2004) examine the strategic behaviour of incumbents and entrants in experiments that involve two incumbents and one potential entrant. The games are based on Bagwell and Ramey's (1991) model of oligopoly limit pricing. Incumbents first learn about an industry parameter that determines whether their costs are low or high and they next simultaneously choose prices. Upon observing these two prices, an entrant who does not know the industry cost, tries to infer it, and next decides whether or not to enter. Higher costs are associated with lower profits implying that incumbents, presumably, wish to signal high costs. Consequently, one is tempted to expect that prices will be distorted upward when industry costs are low. However, Bagwell and Ramey isolate circumstances under which a "no-distortion" exists and incumbents play as if there was complete information or no entry threat at all. In this separating equilibrium, costs are revealed and entry takes places only if it is profitable (i.e. when costs are low). Thus, with at least two firms already in the market, in the no-distortion equilibrium, incumbents are unable to coordinate deception; hence, no limit pricing exists.

Müller et al. (2004) run both full-information and private-information treatments. When the entrant's outside option is low such that only separating equilibria exist, Müller et al. find evidence for the "no-distortion" equilibrium emphasized by Bagwell and Ramey. In particular, they find that behaviour in the full- and the private-information treatments is very similar and that incumbents' first-period prices quickly converge to the levels predicted under no threat of entry. As the first-period prices signal industry costs quite reliably, entry thus

occurs only when costs are low. When the entrant's outside option is high such that both separating and pooling equilibria exist, Müller et al. find that prices charged by high-cost incumbents in the private-information treatment are similar to those in the full-information treatment. However, in this case, under incomplete information, low-cost incumbents set higher prices than they would under full information. Consequently, entry rates are lower in the former case than in the latter.

3.5.2 Investment into capacity

Mason and Nowell (1998) consider a simple, complete information, two-stage quantity-setting duopoly game based on Dixit (1979). There is one incumbent and one potential entrant. Upon observing the incumbent's quantity, the entrant has to decide whether or not to enter the market. If it enters it pays a (commonly known) fixed cost, which is large enough to ensure that the subgame perfect equilibrium has the incumbent choosing the smallest output that makes it in the best interest for the entrant not to enter.

Mason and Nowell run three treatments varying this entry cost. The experiments consist of 20 periods with random matching and role switching. They find that attempted entry deterrence by incumbents is relatively common and that it becomes more common as time unfolds. Also, the frequency of deterrence attempts clearly rises with the level of fixed entry costs. However, a substantial fraction of the incumbents do not try to exploit their first-mover advantage: they chose quantities that are below the entry-deterring level. Regarding entrants' behaviour, Mason and Nowell find that, conditional on the incumbent player deterring entry, about 75% of the entrants stay out whereas 25% enter nevertheless. It is noteworthy that both of these aspects are persistent even towards the end of the experiments. It seems that the softer behaviour of some of the incumbents might be explained by the fear of punishment which, given entrants' behaviour, did indeed occur in the experiments.

Brandts et al. (2004) report on a test of the entry-deterrence model by Bagwell and Ramey (1996). The starting point of the latter paper is the fact that models predicting incumbents installing entry-deterring excess capacity perform poorly in empirical studies. Bagwell and Ramey consider a three-stage duopoly game: First, the incumbent can (partially) pre-commit to a certain level of (costly) capacity. Upon observing this choice, the entrant can make a similar choice. In the third stage, the two firms simultaneously decide whether or not to

compete in the market by bearing (the rest of) the costs of capacity. This game has two subgame perfect equilibria in pure strategies: one of the firms produces and becomes a monopolist while the other firm shuts down. However, a forward induction argument selects the entrant's preferred equilibrium, implying that there is second-mover advantage.

Contrary to this prediction, Brandts et al. (2004) find that the incumbent becomes the monopolist three times as often than the potential entrant (and that costly pre-installation is relatively rare for both the incumbent and the entrant). Moreover, over time play does not converge in the direction of the Bagwell-Ramey prediction. An explanation offered by Brandts et al. is that players might enter the game being equipped with a social norm that says that first movers have a greater entitlement.[41] This pre-conception is apparently not eroded as time unfolds and players gain experience.

Let us conclude this subsection by noting that Brandts et al. also run a simple Dixit-style control treatment. As in Mason and Nowell (1998), they find that the predicted first-mover advantage is strong even when the incumbent does not engage in entry deterring investment. However, when the incumbent does pre-install capacity the advantage is substantially more pronounced.

3.6 Predatory pricing[42]

The first paper investigating the possible emergence of predatory pricing in the laboratory is Isaac and Smith (1985). They implement a posted-offer duopoly market that is served by a large seller and a small one. The large seller has a cost advantage over the other seller, a higher capacity and a larger cash endowment. Sellers don't know demand, or each other's cost functions. After prices (but not the quantities) were made public, demand was simulated. In the experimental market, there is a predatory price range where the large seller provides 10 units at a price that is (a) lower than the small seller's minimum average price; (b) lower than the large seller's marginal cost of his 10th unit, and (c) demand is exhausted. In this case, the small seller cannot earn positive profits, while the large seller does not suffer losses, although his profits at the predatory price-quantity combination are lower than at the competitive equilibrium. In these markets no predatory pricing is observed.

[41] This explanation was put forward in Huck and Müller (2005) who report on the "money-burning" game.
[42] See Gomez, Goeree, and Holt (2004) as well as Capra, Goeree, Gomez, and Holt (2000) for other overviews on predatory pricing.

This “negative” result induced Isaac and Smith to make several design changes. In a first design change, sellers are required to purchase entry permits. But again, no predatory pricing is observed. As a second design change, sellers are given full information about each other's costs. Yet, again, no predatory pricing is observed. Thus, this first “search of predatory pricing” was unsuccessful. Isaac and Smith conclude: “We are unable to produce predatory pricing in a structural environment that, *a priori*, we thought was favourable to its emergence” (p. 342)

Harrison (1988) continues the hunt for predatory pricing. He modifies the Isaac and Smith design by implementing five simultaneous posted-offer markets and introducing 11 sellers. Four sellers are told that they would become large sellers (with costs as introduced in the Isaac and Smith experiments) if they would choose to enter “their” market, but that they would become small sellers in case they entered any other market. The seven remaining sellers are small sellers no matter which market they chose to enter. Efficiency demands that each of the four large sellers enters his preferred market, each of which would also see entry of a small seller, and for the remaining three small sellers to enter the fifth market in which no seller would have a cost advantage. Note that the fifth market serves as an "active escape opportunity" for the small sellers. Again, demand (as in the Isaac and Smith experiments) is simulated in each market. Finally, at the beginning of each market period, firms choose a market to enter, a price and a corresponding maximum quantity. With this setup, Harrison reports cases of predatory pricing in the sense defined above.

However, Goeree and Gomez (1998) replicate the Harrison study with the result that only 3 out of 144 price decision of large buyers could possibly be classified as predatory. Note that in this design entry, price and quantity decisions are made simultaneously. This means that e.g. a large seller never knows whether he would be a monopolist in his market or whether he would share it with a small seller.

Consequently, Capra, Goeree, Gomez, and Holt (2000) vary Harrison's design in two respects: (a) Small sellers first choose their markets (which become commonly known) before all sellers choose prices and quantities (Large sellers can now react to entry and possibly raise prices after exit). (b) Large incumbent sellers have complete information about demand and other's costs whereas small sellers only know own costs. Presumably, this makes it more

likely that a large seller prices more aggressively. And in fact, Capra et al. (2000) report that predatory pricing consistently arose in most markets.

Jung, Kagel and Levin (1994) report on tests of Selten's (1975) chain-store game and Kreps and Wilson's (1982) reputation model.[43] In the model by Selten, there is an incumbent (a chain store) who is a monopolist in several (finitely many) markets where it is operating the same technology and producing the same products. In each market, it faces potential entry. More precisely, in the first market, first the entrant decides about entry. Then, if entry occurs, the incumbent decides whether to fight or to accommodate. The outcome of this interaction becomes publicly known before in the second market the same stage game is played between the incumbent and a new entrant, etc. In Selten's model the incumbent is weak and prefers to share each market in which entry occurs. Applying backward induction, Selten shows that each entrant enters and is always accommodated.

Kreps and Wilson's (1982) model is similar to Selten's, however, now entrants have incomplete information regarding the type of the incumbent: with some probability the incumbent is strong (low cost) and would always fight entry; with the complementary probability the incumbent is weak (high cost) and, as in Selten's model, prefers to share each market. Kreps and Wilson derive a sequential equilibrium in which the weak incumbent fights entry in the first markets to make the entrants believe it is strong. Only towards the end of the game does it start to accommodate entry. The fact that weak incumbents fight entry in early periods of the game can be interpreted as predatory pricing. (In fact, Kreps and Wilson (1982) define predation exactly in this way.)

Jung et al. (1994) implement markets in which a monopolist plays a sequence of eight periods against different entrants. They implement both a version of the Selten set-up, as well as a version of the Kreps and Wilson model. Using the Kreps and Wilson (1982) definition of predatory pricing, they report that, for experienced subjects, predatory pricing occurred in 100% of the cases in the Kreps and Wilson model and in 85% of the games in the Selten model. Furthermore, entry rates during early periods of the game are reported to be near 0%

[43] Jung et al. (1994) is not the first and only paper reporting experimental results on reputation building. Camerer and Weigelt (1988), Neral and Ochs (1992) as well as Brandts and Figueras (2003) also report on reputation building in the lab. However, they cast the Kreps and Wilson model in a lender-borrower frame. The latter has some strategic consideration in common, but also important differences. For instance, whereas the lender-borrower game can be given a "cooperative" interpretation, the Kreps and Wilson game has more of a "competitive" flavour. We therefore, refrain from providing details of these experiments, as they seem not to be directly related to the kind of situations we consider in this paper.

in the Kreps and Wilson model and as low as 30% in the Selten model. In the Selten model, the experimental results thus differ markedly from what theory predicts. However, regarding the Kreps and Wilson model, also some deviations are reported. First, entry rates increase constantly towards the end of a game while the Kreps and Wilson model predicts fixed entry rates during these periods of mixed-strategy-play. Furthermore, entrants do not enter more often after periods in which no entry occurred than after periods in which entry and fighting occurred.

3.7. Essential Facilities and Foreclosure

Rey and Tirole (2003) define foreclosure as "a dominant firm's denial of proper access to an essential good it produces, with the intent of extending monopoly power from that segment of the market (the bottleneck segment) to an adjacent segment (the potentially competitive segment)." These authors, however, also point out that a monopolist on an upstream market, faced with competition on the downstream market, may not be fully able to exploit its monopoly power as a result of the fact that it may not be able to make a credible commitment to downstream firms that it will restrict output. As a consequence, downstream firms will not accept contracts that allow the producer to extract full monopoly profits. Of course, vertical integration can resolve this commitment problem and enable the upstream monopolist to fully exploit its market power, but such integration may be blocked by the merger regulation. Martin et al. (2001) study this commitment problem of such an upstream monopolist in an experimental setting. The basic structure that they consider has a single upstream firm that produces an input at constant average and marginal costs and two downstream firms that convert each unit of input into a unit of a homogeneous final good. The upstream monopolist can simultaneously make take-it-or-leave-it contract offers to each of the downstream firms specifying a quantity and a fixed payment it demands for the bundle.

In a first treatment these contract offers become publicly known before downstream firms decide. Public contracts serve as a commitment device such that the upstream monopolist can earn the monopoly profit for itself by offering contracts that consist of offering half the monopoly output at half the monopoly profit to each downstream firm. If, however, the contracts negotiated privately, such that a downstream firm will not observe the contract the upstream monopolist offers to the other downstream firm, the upstream monopolist may no longer be able to obtain the monopoly profit. Predictions in this treatment depend on out-of-equilibrium beliefs of a downstream firm concerning the contract that is being offered to its

rival. More precisely, if a downstream firm entertains *passive* beliefs, it thinks that its rival receives the equilibrium offer. In this case it can be shown that output is higher, and the upstream monopolists' profits are lower than in the joint-profit-maximizing outcome.[44] A third treatment implements the case where the upstream monopolist integrates vertically with one of the downstream firms. Here, the integrated firm can commit to sell the monopoly quantity through its downstream subsidiary and not supply the other downstream firm at all, hence, there is foreclosure.

Martin et al. find partial support for the arguments from Rey and Tirole (2003) and the foreclosure theory. When contracts are secret (i.e. in the presence of a commitment problem), outputs are higher and the upstream monopolists' profits are lower than in case contracts are public or in case of an integrated firm. However, the differences are not as pronounced as theoretically predicted. Moreover, the experimental results differ from the theoretical predictions with regard to the division of profits between upstream and downstream firms. Theory predicts that the upstream firm should have all the bargaining power (by making take-it-leave-it offers) such that it should be able to extract all of the industry profits. This is observed most of the time in the treatment with an integrated firm. However, in the two non-integrated treatments, with public respectively secret contracts, the upstream monopolist only obtains a fraction of industry profits. It seems that the threat of the downstream firms to reject the upstream firm's offer limits the latter firm's bargaining power.[45] This unpredicted bargaining effect provides another rationale for vertical integration, different from the ones that are usually discussed in the literature. As Martin et al. conclude: "other vertical restraints may not allow the upstream firm to extract as much industry rent as full vertical integration." (p.479)

4. CONCLUSION

When sections 2 and 3 above are put side by side, one cannot help noticing the discrepancy between the issues dealt with in each section. Whereas, for instance, it appears from the survey of the case-law that the application of Article 82 EC to rebate schemes or to access to

[44] There is, however, another equilibrium (with *symmetric* beliefs) in which the outcome is the same as with public contracts. However, Rey and Tirole (2003) argue that the assumption of passive beliefs is theoretically more sound.

[45] Martin et al. discuss (dis)similarities of their treatments with the ultimatum game for which experimental results reject the subgame perfect equilibrium prediction with its extremely asymmetric payoff consequences.

facilities has attracted a lot of attention, these themes do not seem to have been featured prominently in the experimental economic literature. Conversely, experimental economists have devoted considerable resources to investigating predation theories, whereas the case-law does not appear to indicate that this has been a significant issue in the application of EC competition law.

One can speculate on a number of competing explanations for this discrepancy. We will look into two different hypotheses: the first one is that experimental economists would be out of phase with market developments, and the second one is the mirror hypothesis, namely that the sample of case-law studied in Section 2 is either not representative or biased in favour of certain types of issues.

With respect to the first hypothesis, experimental economists appear to work mostly on testing theories or improving on other experiments. Most experimental studies are motivated either by a theoretical paper or by another experimental study. The research agenda in experimental economics does not seem to be driven by the occurrences in real-life situations, very few experimental studies are directly inspired by a real-world phenomenon or problem. Anecdotal evidence for this observation comes from a quick look at the program of the 2005 International Meeting of the Economic Science Association (ESA), which is the professional organization of experimental economists. Only about 5-10% of the papers presented at that meeting are directly inspired by real-life problems. Clearly, there are many real world phenomena that, in principle, might be of interest to experimental economists, hence, given the already small overall percentage, one can only expect a very small number of papers to deal with antitrust issues, or with issues in industrial organization more generally. In the past, within industrial organization, experimental economists have been enthusiastic about doing experiments on auctions or other aspects of market design, in contrast to market regulation. The current preference might still be in that direction. For example, one of the few experimental papers on industrial organization issues presented at the ESA 2005 meeting, Porter et al. (2005), report on a commission from the State of Virginia to have experimental economists explore alternatives for the design of an auction that allocated bankable NOx allowances.

With respect to the second hypothesis, the last decades of Article 82 EC enforcement do not appear to have been driven by any specific agenda on the part of the Commission. The only

exception is the use of Article 82 EC as part of the liberalization policy pursued in network industries such as telecommunications, post, energy or transport, which accounts for a fair number of cases. Leaving this aside, there is no evidence that the Commission systematically set out to identify the most pressing problems in the area of Article 82 EC and then to direct its enforcement activities at these problems. This might be changing now in the wake of the modernization brought about by Regulations 1/2003 and 139/2004, which highlighted the state of neglect in which Article 82 EC had fallen. In any event, a large number of the cases surveyed arose out of preliminary references to the ECJ, and these definitely do not follow any agenda.

The case-law and the decision practice of the Commission could thus very well be affected mostly by the relatively haphazard flow of complaints to the Commission and preliminary references to the ECJ, so that the data derived from the table in Annex I would not have much aggregate significance as an indication of which problems are truly pressing and should be addressed by experimental economics. At the same time, it is conceivable that the complaints and preliminary references themselves are statistically indicative of which issues are most significant in the European economy, since they are made at the initiative of aggrieved parties. Yet not all complaints are taken up by the Commission and not all cases before national courts are sent to the ECJ by way of preliminary reference. Both the Commission (in deciding which complaint to pursue) and the national courts (in deciding whether to send a preliminary reference to the ECJ) have some measure of discretion. In the case of the Commission, it is a question of assessing whether dedicating resources to a complaint is in the Community interest.[46] In the case of the national court, it must be seen whether a preliminary reference is useful to the solution of the case and whether the issue to be referred to the ECJ has not perhaps already been conclusively settled by the ECJ.

It might thus be that the Commission and the ECJ are busy with cases that do not reflect the truly important issues surrounding the presence and use of market power in the European economy. For the Commission in particular, there might be a historical bias in favour of dealing with issues concerning relationships between competitors, such as rebates, refusals to deal, etc., arising out of the heritage of unfair competition laws and of the intellectual tradition

[46] See the Notice on the handling of complaints by the Commission under Articles 81 and 82 of the EC Treaty [2004] OJ C 101/67.

of ordoliberalism.[47] Furthermore, in deciding which complaints to take up, the Commission might also be influenced by the lobbying efforts of complainants. That certain issues appear to be more of a concern for the Commission would then reflect more effective or persuasive arguments presented by the complainants on these issues, as opposed to an inherent significance of the issue.

Let us now come back to some of the questions that we have posed at the beginning of this overview:

1. Is there scope for further experiments within the sphere of abuse of dominance?

As stated above, one of the things we were surprised about is the relatively limited number of experiments that deal with abuse of a dominant position in the strict sense. Perhaps, in retrospect, this is nothing to be surprised about: experimental economists have not let themselves be guided very much by Article 82 cases, they have their own research agenda and there is nothing wrong with that. Despite this, Section 2 of this paper has indicated some of the issues that antitrust practitioners worry about and we believe that some of these problems might interest experimental economists. In particular, experimental work on the following topics is limited, or completely missing, at the moment and additional work on these may attract the interest of practitioners:

- Price discrimination (non-linear rebate schemes, loyality rebates, etc.)
- Bundling and tying
- Refusal to deal in a vertical relationship
- Exclusion and exclusivity clauses
- Predatory product differentiation

2. Is the gap between experimental research results supplied by the literature and the demand of case handlers due to the inherent boundaries of experimental research as such?

Our preliminary answer to this question is "No", with some qualifications. It seems fair to say that competition authorities are using more and more economic reasoning when analysing

[47] See D.J. Gerber, *Law and Competitino in Twentieth Century Europe* (Oxford: OUP, 1998) for an account of the history of competition law in Europe and its intellectual lineage.

cases and that, in particular, the application of theoretical models of strategic behaviour will become more widespread.[48] It is, therefore, important to have a wealth of empirical evidence showing that the theoretical models the competition authorities rely on are indeed valid. Such evidence would help policy makers and courts to distinguish "normal" competitive behaviour from illegal practices. Surely, there is no shortage of theoretical models of strategic behaviour. What is missing, however, is empirical evidence. This is not surprising: in general it is hard to come by empirical evidence, especially since both theoretical models and business practices crucially depend on private information (for example about costs) that is inaccessible for outside observers.[49] A unique advantage of experimental methods is that all parameters of a market are under control and, more importantly, observable. This is not only true for firms' private information such as costs, but also for conspiratorial activities as in Davis and Holt (1998). Consequently, the value of experimental economics for antitrust practitioners may be indirect: by separating the theories that are empirically relevant from those that are not.

Let us illustrate with an example. Huck et al. (2002) report on an experiment with bilateral mergers imposed in three- and four-firm Cournot oligopolies with constant unit costs. Theory predicts that these mergers are not profitable for the merged firms (see Salant et al., 1983). While theory predicts aggregate output well, it fails to predict individual quantities. Contrary to the prediction, post-merger markets are not symmetric, as merged firms produce a larger output compared to unmerged firms, and unmerged firms yield to the more aggressive behaviour of merged firms. As a result, in the markets with initially four firms the merger is profitable in the short run, and merged firms break even in the long run. This asymmetry of individual outputs has an interesting implication for the econometric merger analysis. Much of the econometric work on mergers using field data has involved structural estimation based on Nash equilibrium behaviour. In such studies, deviations from symmetric Cournot outcomes might be accounted for by differences in firms' marginal cost. In the absence of direct evidence on costs, field-data studies might well conclude that the merger resulted in

[48] Note for example eminent economic theorists' involvement in antitrust cases. See also Brennan (2000, p.12) who reflects on the increasing importance of game theory in antitrust economics.

[49] The lack of empirical evidence and the problems of obtaining it are acknowledged by leading economists in the field. In fact, Scherer and Ross (1990) state that it is "difficult to observe systematically the actions taken by incumbents to deter entry" (p.392). Or consider Wilson (1992) who states that "The plethora of predictions obtainable from various formulations indicate that empirical and experimental studies are needed to select among hypotheses. Many models present econometric difficulties that impede empirical work, but this is realistic: the models reveal that strategic behaviour can depend crucially on private information inaccessible to outside observers. Estimation of structural models is likely to be difficult, therefore, but it may be possible to predict correlations in the data. Experimental studies may be more effective;" (p.324)

efficiencies that reduced marginal cost and caused the merged firm to increase output. As the alleged efficiency increase is part of the welfare effect of the merger, conclusions about the desirability of the merger are misleading. In the laboratory, the experimenter can control for the underlying parameters, such as marginal cost, and a behavioural hypothesis such as Nash equilibrium behaviour can be accepted or rejected based on evidence.

Experimental economics can contribute to observation-based underpinnings of strategic-behaviour issues that can inform both theorists and antitrust practitioners. We think this is important as some economists argue that that there is some "judicial scepticism" against certain kinds of strategic behaviour such as predatory pricing that has led to dismiss charges of such behaviour in court cases until recently (see e.g. Bolton et al. 2000). But experimental economists have helped to isolate circumstances under which e.g. predatory pricing is likely to arise (see above). So, all evidence obtained from carefully and appropriately designed experiments should be welcome.

Some caveats need to be mentioned. Clearly, there are many situations where experimental economics will not be helpful assessing antitrust issues. For example, it is not possible to decide in the laboratory the cost function that a firm under scrutiny has. In general, all aspects that define a particular market (like the number of firms, costs, demand, or the strategic variable (e.g. price, quantity or advertising outlets)) cannot be determined in the lab. One can only (and freely) specify these variables and experimentally investigate which effect particular realizations of these variables have on the (mis) behaviour of firms.

Another qualification is in order with regard to the specific subject pool used in most experiments: college students. However, it is likely that recent attempts to extend the methods that experimenters usually use will prove successful in increasing the general relevance of experimental procedures obtained using convenient student samples. (See Harrison and List (2004) on the relationship of laboratory and field experiments.)

3. What are the lessons from this paper for using experimental research in antitrust enforcement?

In the wake of *Tetra Laval*,[50] experimental economics appears more relevant than ever for the enforcement of competition law. In that case, the ECJ made it clear (for example in paragraphs 39 and 42) that the Commission must be careful in its analysis, and in particular that the economic analysis used by the Commission must be solid. While *Tetra Laval* dealt with merger control, there is no reason to believe that the ECJ would expect less from the Commission in Article 82 EC cases. Against that background, experimental economics can prove very useful in supporting (or weakening) theoretical claims. In the face of competing economic models, it can be conceived that experimental economics could be used to try to assess, in an objective and verifiable fashion, which of the competing theoretical claims made by various parties in a case is most solid.

The ability of experimental economics to test theoretical models against real-world assumptions as to rationality and information, in particular, could greatly help to test theoretical claims. In the end, only the largest firms can be assumed to come close to the standard theoretical assumptions about rationality. Accordingly, in cases involving consumers (exploitative abuses) or smaller competitors (exclusionary abuses), experimental economics could make a worthy contribution.

On a general level, there is an indirect link between experimental research and the work of competition practitioners. As also stated above, there is a strong link between theory and experimentation in the lab, hence, experimental research can help to assess the usefulness of a theory's (behavioural) assumptions or proposed mechanisms. And to the extent that competition authorities rely on theoretical models of firm behaviour, experimental economics can help to assess a model's validity. But we feel that much more work needs to be done here.

In recent years we see that the work of experimental economists and psychologists in conjunction with theorists and competition lawyers helps to shape the behavioural approaches to industrial organization as well as to law and economics. (For the former see for instance the conference on "Behavioural Industrial Organization" organized by the Wissenschaftszentrum Berlin (WZB) or the talk "Behavioural Industrial Organization" delivered by Timothy Cason at the Annual Meeting of the Economic Science Organization in Montreal 2005. For the latter see for instance Jolls, Sunstein and Thaler (1998).) These efforts are based on the insight that human economic actors are far less perfect than the ideal neoclassical agent and try to explore

[50] ECJ, Case C-12/03, *Tetra Laval*, not yet reported.

the consequences of various limitations for the functioning of markets. Theses efforts will hopefully lead to a more realistic modelling of competition in markets.

On a more specific level, the review of experimental studies for example in section "predatory pricing" nicely illustrates how continuous efforts of experimental economists help to isolate conditions under which such practices are (un) likely to occur.

Vickers (2005) notes that the EU law on abuse of dominance is far from settled and that it could develop in either of two broad directions, with emphasis either on legal form or on economic effect. He sees advantages from an evolution in the latter direction but notes that these advantages will be realized only "if European competition law on abuse of dominance becomes more firmly anchored to economic principles, and where those principles are practically applicable by competition authorities, lawyers and the courts". He furthermore notes that "to be effective, economics must contribute in a way that competition agencies, and ultimately the courts, find practicable in deciding cases." In our view, experimental economics can definitely serve as a tool to make economics effective. In this respect, we note that Davis and Wilson (2002) also offer some thoughts as to how competition practitioners might benefit from applications of the experimental method.

References:

Aghion, P. and P. Bolton (1987): Contracts as a barrier to entry, *American Economic Review* 77, 388-401.

Bagwell, K. and G. Ramey (1991): Oligopoly Limit Pricing, *RAND Journal of Economics* 22 (2), 155-172.

Bagwell, K., and G. Ramey (1996): Capacity, Entry and Forward Induction, *RAND Journal of Economics* 27, 660-680.

Bolton, P., J.F. Brodley, and M.H.Riordan (2000): Predatory Pricing: Strategic Theory and Legal Policy, *Georgetown Law Review* 88, 2239-2330.

Bonnano, G. (1987): Location choice, product proliferation and entry deterrence', *Review of Economic Studies* LIV, 37-45.

Boyer, M., P. Mahenc, and M. Moreaux (2003): Entry preventing locations under incomplete information, *International Journal of Industrial Organization* 21, 809-829.

Brandts, J., A. Cabrales, and G. Charness (2004): Entry deterrence and forward induction: An experiment, *Working Paper*, Universitat Pompeu Fabra.

Brandts, J. and N. Figueras (2003): An exploration of reputation formation in experimental games, *Journal of Economic Behaviour & Organization* 50, 89–115.

Brennan, T. J. (2000): The economics of competition policy: recent developemnts and cautionary notes in antitrust and regulation, *RFF Discussion Paper*, Washington.

Camerer, C. and K. Weigelt (1988): Experimental Tests of a Sequential Equilibrium Reputation Model, *Econometrica* 56, 1-36.

Capra, C.M., J.K. Goeree, R. Gomez, and C.A. Holt (2000): Predation, Asymmetric Information, and Strategic Behaviour in the Classroom: An Experimental Approach to the Teaching of Industrial Organization, *International Journal of Industrial Organization* 18, 205-225.

Cason, T. and T. Sharma (2001): Durable Goods, Coasian Dynamics and Uncertainty: Theory and Experiments, *Journal of Political Economy* 109, 1311-1354.

Cooper, D. J., S. Garvin, and J. Kagel (1997a): Signalling and Adaptive Learning in an Entry Limit Pricing Game, *Rand Journal of Economics*, 28 (4), 662-683.

Cooper, D. J., S. Garvin, and J. Kagel (1997b): Adaptive learning vs. equilibrium refinements in an entry limit pricing game, *Economic Journal* 107, 553-575.

Coursey, D., R.M. Isaac, and V.L. Smith (1984): Natural Monopoly and the Contested Markets: Some Experimental Results, *Journal of Law and Economics* 27, 91-113.

Davis, D.D. and C.A. Holt (1993): *Experimental Economics*, Princeton University Press.

Davis, D.D. and C.A. Holt (1994): The effects of discounting opportunities in laboratory posted-offer markets, *Economics Letters* 44, 249-253.

Davis, D.D. and C.A. Holt (1996): "Markets with Posted Prices: Recent Results from the Laboratory, *Investigaciones Económicas*, *20*, 291-320.

Davis, D.D. and C.A. Holt (1998): Conspiracies and Secret Price Discounts, *Economic Journal* 108, 736-756.

Davis, D.D. and B.J. Wilson (2002): Experimental Methods and Antitrust Policy, in: *Research in Experimental Economics, Special Issue Experiments Investigating Market Power*, Vol. 9, eds.: C.A. Holt and R. Mark Isaac, JAI Press, Elsevier Science, 61-94**.**

Deck, C.A. and B.J. Wilson (2003): Experimental Gasoline Markets, *FTC Working Paper* No. 263.

Dixit, A. (1980): The role of investment in entry deterrence, *Economic Journal* 90, 95-106.

Dolbear, F.T., Lave, L.B., Bowman, G., Lieberman, A., Prescott, E., Rueter, F., Sherman, R. (1968): Collusion in oligopoly: an experiment on the effect of numbers and information, *Quarterly Journal of Economics* 82, 240–259.

Dufwenberg, M. and U. Gneezy (2000): Price competition and market concentration: an experimental study, *International Journal of Industrial Organization* 18, 7–22.

Engle-Warnick, J. and B.J. Ruffle (2004): Buyer Concentration as a Source of Countervailing Power: Evidence from Experimental Posted-Offer Markets, *Working Paper*, Ben Gurion University.

Fouraker, L. and S. Siegel (1963): Bargaining Behaviour, McGraw-Hill, New York.

Goeree, J.K. and Gomez, R. and C. Holt (2004): Predatory Pricing: Rare Like a Unicorn?, forthcoming in C. Plott and V.L. Smith (eds.), *Handbook of Experimental Economic Results*, New York: Elsevier Press.

Güth, W., P. Ockenfels, and K. Ritzberger (1995): On Durable Goods Monopolies: An Experimental Study of Intrapersonal Price Competition and Price Discrimination over Time, *Journal of Economic Psychology* 16, 247–74.

Güth, W., S. Kröger, and H.-T. Normann (2004): Durable Goods Monopoly with Privately Known Impatience, *Economic Inquiry* 42, 413-424.

Harrison, G.W. (1988) "Predatory Pricing in a Multiple Market Experiment. A Note," *Journal of Economic Behaviour and Organization* 9, 405-417.

Harrison, G. and J.A. List (2004): Field Experiments, *Journal of Economic Literature*, forthcoming.

Harrison, G.W. and M. McKee (1985): Monopoly Behaviour, Decentralized Regulation, and Contestable Markets: An Experimental Evaluation, *Rand Journal of Economics* 16, 51-69.

Harrison, G.W., M. McKee, and E.E. Rutstrom (1989): Experimental Evaluation of Institutions of Monopoly Restraint," Chapter 3 in L. Green and J. Kagel (eds.), *Advances in Behavioural Economics*, *vol. 2*, Ablex Press, Norwood, 54-94.

Holt, C.A. (1995): Industrial Organization: A Survey of Laboratory Research, in J. Kagel and A. Roth (eds.), *Handbook of Experimental Economics*, Princeton: Princeton University Press, 1995, 349-443.

Huck, S. and W. Müller (2005): Burning money and (pseudo) first-mover advantages: An experimental study on forward induction, *Games and Economic Behaviour*, forthcoming.

Huck, S., K.A. Konrad, W. Müller, and H.-T. Normann (2002): The Merger Paradox and Why Aspiration Levels Let It Fail in the Laboratory, *Working Paper*, University of Tilburg.

Hudson, D. and J.L. Lusk (2004): What You Don't Know Can Cost You: A Web Based Experiment in Price Discrimination, *Review of Agricultural Economics* 26, 392-403.

Isaac, R.M., V. Ramey, and A.W. Williams (1984): The Effects of Market Organization on Conspiracies in Restraint of Trade, *Journal of Economic Behaviour and Organization* 5, 191-222.

Isaac, M. R. and V. L. Smith (1985): In Search of Predatory Pricing, *Journal of Political Economy* 93 (2), 320-45.

Jolls, C., C.R. Sunstein, and R. Thaler (1998): A Behavioural Approach to Law and Economics, *Stanford Law Review* 50, 1471-1550.

Jung, Y. J., J. H. Kagel, and D. Levin (1994): On the existence of predatory pricing: An experimental study of reputation and entry deterrence in the chain-store game, *RAND Journal of Economics* 25, 72-93.

Martin, S., Normann, H.-T. and C.M. Snyder (2001): Vertical foreclosure in experimental markets, *RAND Journal of Economics* 32, Autumn, 466–496.

Mason, C.F. and C. Nowell (1998): An experimental analysis of subgame perfect play: The entry deterrence game, *Journal of Economic Behaviour & Organization* 37, 443-462.

Milgrom, P. and J. Roberts (1982): Limit pricing and entry under incomplete information, *Econometrica* 50, 443-460.

Morgan, J., H. Orzen, and M. Sefton (2005): "An Experimental Study of Advertising and Price Competition," *European Economic Review,* forthcoming.

Motta, M. (2004): *Competition Policy: Theory and Practice*, Cambridge University Press.

Müller, W., Y. Spiegel, and Y. Yehezkel (2004): Oligopoly limit pricing: Experimental evidence, *Working Paper*, University of Tilburg.

Neral, J. and J. Ochs, (1992): The Sequential Equilibrium Theory of Reputation Building: A Further Test, *Econometrica* 60*,* 1151-69.

Normann, H.-T. Ruffle, B. and C. M. Snyder (2004): Do Buyer-Size Discounts Depend on the Curvature of the Surplus Function? Experimental Tests of Bargaining Models, *Working Paper*, Royal Holloway London.

Porter, D., S. Rassenti, V. Smith, and A. Winn (2005): The Design, Testing and Implementation of Virginia's NOx Allowance Auction, mimeo.

Ramseyer, J.M., E. Rasmusen, and J. Wiley (1991): Naked Exclusion, *American Economic Review* 81, 1137-1145.

Rapoport, A., I. Erev, and R. Zwick (1995): An Experimental Study of Buyer-Seller Negotiation with One-Sided Incomplete Information and Time Discounting, *Management Science* 41, 377–94.

Rey, P. and J. Tirole (2003): A Primer on Foreclosure, *Handbook of Industrial Organization*, vol. III, M. Armstrong and R. Porter (eds.), New York: North-Holland.

Reynolds, S.S. (2000): Durable-Goods Monopoly: Laboratory Market and Bargaining Experiments, *Rand Journal of Economics* 31, 375–94.

Scherer, F. and D. Ross (1990): *Industrial Market Structure and Economic Performance*, 3rd ed., Rand McNally & Co.

Segal, I. and M.D. Whinston (2000): Naked Exclusion: Comment, *American Economic Review* 90, 296-309.

Selten, R., (1978): The chain-store paradox, *Theory and Decision* 9, 127–159.

Smith, V. L. (1981): An Empirical Study of Decentralized Institutions of Monopoly Restraint, in J. Quirk and G. Horwich (eds.) *Essays in Contemporary Fields of Economics in Honor of E.T. Weiler (1914-1979)*, West Lafayette: Purdue University Press, 83-106.

Vickers, J., (2005): Abuse of market power, *The Economic Journal* 115, F244-F261

Wellford C.P. (2002): Antitrust: Results from the Laboratory, in: *Research in Experimental Economics, Special Issue Experiments Investigating Market Power*, Vol. 9, eds.: C.A. Holt and R. Mark Isaac, JAI Press, Elsevier Science, 1-60.

Wilson, R. (1992): Strategic Models of Entry Deterrence, in: R. Aumann and S. Hart (eds.), *Handbook of Game Theory*, Volume 1, Chapter 10, 305-329. Amsterdam: North-Holland/Elsevier Science Publishers.

ANNEX 1: Overview of the ECJ/CFI case law and the Commission decision practice under Article 82 EC

The table on the following pages was established using the following methodology:

- It includes Commission decisions published in the Official Journal (including recent decisions soon to be published). Unpublished decisions, informal pronouncements, etc., which might have been mentioned in press releases or in the Commission Annual Competition Reports, have been left aside. They are usually less significant.
- It includes ECJ cases decided on a preliminary reference from national courts (Art. 234 EC). Appeals to the CFI/ECJ from Commission decisions are dealt with under the corresponding Commission decision.
- It includes only cases decided under Article 82 EC where the Commission or the court identified the abuse in question. There are other cases (essentially from the ECJ) where Article 82 EC was at stake, but where the abuse was not discussed.
- Cases involving Article 82 EC in conjunction with Article 86 EC, although numerous (especially at the ECJ level) were left aside. These cases are not always entirely relevant, since they concern how State measures, in connection with public-sector firms or firms enjoying monopoly rights, can lead to abuses of dominant position. It can be argued that the specific context of these cases colours the discussion therein of what constitutes an abuse
- For each case, the date of the decision is given, followed by an overview of the procedure and the type of abuse involved. There can be more than one per case. Note that in the Commission decisions, there was a finding of abuse for the types of practices indicated on the table for that case (sometimes reversed by the CFI/ECJ on appeal), whereas in its decisions on preliminary rulings, the ECJ sometimes indicated that it did not see any abuse with respect to the types of practices indicated on the table for that case.

Case-law and Commission decision practice under Art. 82 EC

Name	Date (1)	Procedure (2)					Impugned practice																																		Remarks		
							Pricing					*Rebates*					*Discr.*			*Refusal to*				*Contractual practices*											*Other*										
		ECJ - Prelim. ref.	Commission Decisions	→ to ECJ (-1988)	→ to CFI (1989-)	→→Appeal to ECJ	Excessive	Predatory	Fixing	Squeeze	Cross-subsidization	Loyalty	Non-linear	Quality	"Fighting"	Whole req.	Betw. Cust.	Towards comp. (Vert.)	Between MSt	Supply IP/info	Cooperate (interlining, etc.)	Access/EFD	Supply goods	Tying	Exploitative clauses	Exclusive binding	Exclusive purchase	Exclusivity	Display exclusivity	Compulsory licensing	Excl. lic. of compet. prod	Restr. on downstr. sales	Unilat. Contract changes	Use of IP rights	Restriction of supply	Affecting market structure	Quotas	Disciplines/Penalties	Segmentation between MSt	Exclusionary tech specs	Collective dominance	Authority	Aftermarket
IMS/NDC	29-04-2004	*																		*																							
Microsoft	24-03-2004		*		**P**															*				*																		
GCG/FS	27-08-2003		*																			*																					
Wanadoo	16-07-2003		*		**P**			*																																		
DT AG	21-05-2003		*		**P**					*																																
Michelin II	31-05-2002		*		**+**								*	*																												
De Post	05-12-2001		*																					*																		
DP AG (X-border mail)	25-07-2001		*				*										*						*												*							
DP AG (parcel service)	20-03-2001		*					*				*																														
NDC/IMS	03-07-2001		*		**-**	**-**														*																						
DSD	20-04-2001		*																											*												
BA/Virgin	13-12-1999		*		**+**							*					*																									
Ilmailulaitos	10-02-1999		*														*																								*	
BNP	21-01-1999	*																														**-**										
Decca	21-12-1998		*																						*														*			

Name	Date (1)	Procedure (2)					Impugned practice																																Remarks		
							Pricing					*Rebates*						*Discr.*			*Refusal to*				*Contractual practices*											*Other*								
		ECJ - Prelim. ref.	Commission Decisions	→ to ECJ (-1988)	→ to CFI (1989-)	→→Appeal to ECJ	Excessive	Predatory	Fixing	Squeeze	Cross-subsidization	Loyalty	Non-linear	Quality	"Fighting"	Whole req.	Betw. Cust.	Towards comp. (Vert.)	Between MSt	Supply IP/info	Cooperate (interlining, etc.)	Access/EFD	Supply goods	Tying	Exploitative clauses	Exclusive binding	Exclusive purchase	Display exclusivity	Compulsory licensing	Excl. lic. of compet. prod	Restr. on downstr. sales	Unilat. Contract changes	Use of IP rights	Restriction of supply	Affecting market structure	Quotas	Disciplines/Penalties	Segmentation between MSt	Exclusionary tech specs	Collective dominance	Authority	Aftermarket
Flat glass	07-12-1998		*		-					*																									*					*		
BPB	05-12-1998		*		-							*					*																									
London Europ. / Sabena	04-12-1998		*																			*																			
Bronner	26-11-1998	*																				*																			
TACA	16-09-1998		*																				*												*					*		
AAMS	17-06-1998		*															*																	*							
Alpha Flight	11-06-1998		*		+	+												*																							
Van den Bergh	11-03-1998		*		+																						*														
FAG	14-01-1998		*															*																								
GT Link	17-07-1997	*															*																									
Tiercé Ladbroke (3)	12-06-1997		*		-															*																						
Irish Sugar	14-05-1997		*									*	*		*			*																								
La Crespelle	05-10-1994	*					*																																		*	
Almelo	27-05-1994	*																								*														*		
Corsica Ferries	17-05-1994	*															*																								*	
HOV SVZ/MCN	29-03-1994		*		+													*																								
Sea Cont. / Stena	21-12-1993		*																			*																			
Cewal	23-12-1992		*		+	-						*			*																									*		

Name	Date (1)	Procedure (2)					Impugned practice																																	Remarks		
							Pricing					*Rebates*						*Discr.*			*Refusal to*				*Contractual practices*											*Other*								
		ECJ - Prelim. ref.	Commission Decisions	→ to ECJ (-1988)	→ to CFI (1989-)	→→Appeal to ECJ	Excessive	Predatory	Fixing	Squeeze	Cross-subsidization	Loyalty	Non-linear	Quality	"Fighting"	Whole req.	Betw. Cust.	Towards comp. (Vert.)	Between MSt	Supply IP/info	Cooperate (interlining, etc.)	Access/EFD	Supply goods	Tying	Exploitative clauses	Exclusive binding	Exclusive purchase	Display exclusivity	Compulsory licensing	Excl. lic. of compet. prod	Restr. on downstr. sales	Unilat. Contract changes	Use of IP rights	Restriction of supply	Affecting market structure	Quotas	Disciplines/Penalties	Segmentation between MSt	Exclusionary tech specs	Collective dominance	Authority	Aftermarket
Warner Lambert/Gilette	10-11-1992		*																															*							
FWA Ship Comm.	01-04-1992		*																																	*			*		
British Midland	26-02-1992		*																		*																			
Tetra Pak II	24-07-1991		*		+	+		*			*								*					*	*	*	*						*				*				
Soda ash - Solvay + ICI(4)	19-12-1990		*										*			*											*														
Tournier / Lucazeau	13-07-1989	*															*																				*					
Ahmed Saeed Flugreisen	11-04-1989	*					*	*	*																																
Magill	21-12-1988		*		+	+														*																					
Volvo/Veng / Renault	05-10-1988	*																*		*																					*
Tetra Pak I	26-07-1988		*		+																								*											
Napier Brown	18-07-1988		*							*			*					*					*	*																	
Bodson	04-05-1988	*					*																																		
Hilti	22-12-1987		*		+	+						*								*	*		*	*																	*
BBI	29-07-1987		*																				*																		
AKZO	14-12-1985		*	+																																					
Brit Leyland	02-07-1984		*	+																	*																				
BT	10-12-1982		*	+			*											*				*																			
GVL	29-12-1981		*	+													*																									

Name	Date (1)	Procedure (2)					Impugned practice																																			Remarks		
							Pricing					*Rebates*					*Discr.*			*Refusal to*				*Contractual practices*										*Other*											
		ECJ - Prelim. ref.	Commission Decisions	→ to ECJ (-1988)	→ to CFI (1989-)	→→Appeal to ECJ	Excessive	Predatory	Fixing	Squeeze	Cross-subsidization	Loyalty	Non-linear	Quality	"Fighting"	Whole req.	Betw. Cust.	Towards comp. (Vert.)	Between MSt	Supply IP/info	Cooperate (interlining, etc.)	Access/EFD	Supply goods	Tying	Exploitative clauses	Exclusive binding	Exclusive purchase	Display exclusivity	Compulsory licensing	Excl. lic. of compet. prod	Restr. on downstr. sales	Unilat. Contract changes	Use of IP rights	Restriction of supply	Affecting market structure	Quotas	Disciplines/Penalties	Segmentation between MSt	Exclusionary tech specs	Collective dominance	Authority	Aftermarket
Michelin I	07-10-1981		*	+									*				*																								
Hoffmann - LaRoche	23-05-1978	*																														*									
Hugin	08-12-1977		*	-																			*																		*
ABG	19-04-1977		*	-									*																												
EMI	15-06-1976	*																														*									
Vitamins	09-06-1976		*	+								*				*																									
United Brands	17-12-1975		*	+ (-)			*										*						*								*									
Gen Motors	19-12-1974		*	-			*																																		
BRT/SABAM	27-03-1974	*																							*	*															
Sugar	02-01-1973		*																																		*				
Commercial Solvents	14-12-1972		*	+																			*																		
Continental Can	09-12-1971		*	-																													*								
Deutsche Gramophon	08-06-1971	*																														*									
GEMA	02-06-1971		*																																		*				
Sirena	18-02-1971	*					*																																		
Parke Davis	29-02-1968	*																														*									
TOTAL		17	50	12	14	6	8	4	2	2	1	7	6	1	2	2	10	8	1	7	3	5	8	5	2	3	3	1	1	1	1	1	4	2	3	2	1	4	1	5	4	3

Name	**Date (1)**	**Procedure (2)**					**Impugned practice**																														**Remarks**		
							Pricing					*Rebates*					*Discr.*			*Refusal to*				*Contractual practices*										*Other*								
		ECJ - Prelim. ref.	Commission Decisions	→ to ECJ (-1988)	→ to CFI (1989-)	→→Appeal to ECJ	Excessive	Predatory	Fixing	Squeeze	Cross-subsidization	Loyalty	Non-linear	Quality	"Fighting"	Whole req.	Betw. Cust.	Towards comp. (Vert.)	Between MSt	Supply IP/info	Cooperate (interlining, etc.)	Access/EFD	Supply goods	Tying	Exploitative clauses	Exclusive binding	Exclusive purchase	Display exclusivity	Compulsory licensing	Excl. lic. of compet. prod	Restr. on downstr. sales	Unilat. Contract changes	Use of IP rights	Restriction of supply	Affecting market structure	Quotas	Disciplines/Penalties	Segmentation between MSt	Exclusionary tech specs	Collective dominance	Authority	Aftermarket
Aggregates							Pricing:				17	Rebates:				18	Discr.:		19	Refusals:			23	Contractual practices:								22										
+				8	10	4																																			
-				4	4	2																																			
Notes:																																									
(1) Date of ECJ judgment (for preliminary references) or Commission decision (for others).																																									
(2) The last three columns indicate which Commission were brought before the ECJ (until 1988) or the CFI (as of 1989, with the possibility of further appeal to the ECJ)																																								
	P: case still pending; +: CFI/ECJ confirms Commission decision; -: CFI/ECJ annuls Commission decision																																								
(3) Decision of the CFI on a action for annulment against a Commission decision rejecting a complaint.																																								
(4) Annulled by CFI (confirmed by ECJ) on procedural rounds, re-issued in 2000)																																								